

## Claims

What is claimed is:

- 5        1. A lime-free admixture composition for hydraulic cement  
         comprising, in combination: about 0.15 pounds to about  
         0.3 pounds of a plurality of emulsifiers per 1600  
         pounds of hydraulic cement, about 0.25 pounds to about  
         1.25 pounds of a plurality of toughening resins per  
10       1600 pounds of hydraulic cement emulsified by said  
         plurality of emulsifiers and about 0.1 pounds to about  
         1.6 pounds of a plurality of accelerators per 1600  
         pounds of hydraulic cement for hardening a mixture  
         comprising hydraulic cement, a plurality of aggregates,  
15       water and the lime-free admixture composition.
  
2. The lime-free admixture composition for hydraulic  
         cement according to Claim 1 further comprising about  
         0.15 pounds to about 3.2 pounds of a plurality of air  
20       entraining agents per 1600 pounds of hydraulic cement  
         for providing microencapsulated air particles in the  
         mixture comprising hydraulic cement, the plurality of  
         aggregates, water and the lime-free admixture  
         composition.
  
- 25       3. The lime-free admixture composition for hydraulic  
         cement according to Claim 1 further comprising about 2  
         pounds to about 4 pounds of a plurality of overcoat  
         resins per 1600 pounds of hydraulic cement for  
30       providing a coating on an outer surface of a hardened  
         product formed from the mixture comprising hydraulic  
         cement, the plurality of aggregates, water and the  
         lime-free admixture composition.

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4. The lime-free admixture composition for hydraulic cement according to Claim 1 further comprising about 0.25 pounds to about 1.25 pounds of a plurality of adhesive resins per 1600 pounds of hydraulic cement for enhancing adhesion of the mixture comprising hydraulic cement, the plurality of aggregates, water and the lime-free admixture composition to a plurality of substrates.

5. The lime-free admixture composition for hydraulic cement according to Claim 1 further comprising less than about 4 pounds of a plurality of adsorbents per 1600 pounds of hydraulic cement for providing a dry lime-free admixture composition when the lime-free admixture comprises liquid ingredients.

6. The lime-free admixture composition for hydraulic cement according to Claim 1 further comprising less than about 4.5 pounds of a plurality of water retention agents per 1600 pounds of hydraulic cement for reducing the amount of water that is added to the mixture comprising hydraulic cement, the plurality of aggregates and the lime-free admixture composition and less than about 1.5 pounds of a plurality of pumping aids per 1600 pounds of hydraulic cement for providing rheological control of the mixture comprising hydraulic cement, the plurality of aggregates, water and the lime-free admixture composition.

7. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein said plurality of emulsifiers is selected from the group of surfactants consisting of anionic, cationic, amphoteric and non-ionic.

8. The lime-free admixture composition for hydraulic cement according to Claim 7 wherein said anionic surfactants is selected from the group consisting of a linear alkyl benzene sulfonate salt of an alkali metal cation, a linear alkyl benzene sulfonate salt of a non-metal cation, an alpha olefin sulfonate salt of an alkali metal cation and an alpha olefin sulfonate salt of a non-metal cation.
9. The lime-free admixture composition for hydraulic cement according to Claim 8 wherein said alkali metal cation is selected from the group consisting of lithium, sodium, potassium, magnesium and calcium, and said non-metal cation is selected from the group consisting of ammonium, alkyl ammonium, aryl ammonium, pyridine, pyrrole, piperidine, derivatives of alkyl ammonium, derivatives of aryl ammonium, pyridine, derivatives of pyrrole and derivatives of piperidine.
10. The lime-free admixture composition for hydraulic cement according to Claim 7 wherein said non-ionic surfactant comprises a mixture of alkyl aryl polyethoxylates, compounded silicone and linear alcohol.
11. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein said plurality of toughening resins is selected from the group consisting of isoprene polymer rubbers, isoprene copolymer rubbers, styrene/butadiene/styrene copolymer rubbers and nitrile copolymer rubbers.
12. The lime-free admixture composition for hydraulic cement according to Claim 11 wherein said plurality of toughening resins is in crumb form.

13. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein said plurality of toughening resins comprises water redispersible polymers.
14. The lime-free admixture composition for hydraulic cement according to Claim 13 wherein said water redispersible polymers is selected from the group consisting of vinyl acetate/vinyl versatate copolymers, ethyl vinyl acetate copolymers, polyvinyl acetate polymers and polyvinyl acetate copolymers.
15. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein said plurality of accelerators is a thiosulfate salt of a cation selected from the group consisting of lithium, sodium, potassium, barium, calcium and ammonium.
16. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein said plurality of accelerators comprises a free radical initiator selected from the group consisting of peroxides, azo compounds and hydroperoxides.
17. The lime-free admixture composition for hydraulic cement according to Claim 16 wherein said free radical initiator is selected from the group consisting of dicumyl peroxide and benzoyl peroxide.

18. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein said plurality of accelerators comprises a combination of ingredients comprising aliphatic polycarboxylates, alkylaryl polyoxyethylene ethanol, butyl and isopropyl alcohol, NEODOL® 91-6 and phenyltrimethyl siloxane.

19. The lime-free admixture composition for hydraulic cement according to Claim 2 wherein said plurality of air entraining agents comprises a combination of ingredients comprising aliphatic polycarboxylates, alkylaryl polyoxyethylene ethanol, butyl and isopropyl alcohol, NEODOL® 91-6 and phenyltrimethyl siloxane.

20. The lime-free admixture composition for hydraulic cement according to Claim 3 wherein said plurality of overcoat resins comprises a combination of latex polyvinyl acetate polymers and copolymers.

21. The lime-free admixture composition for hydraulic cement according to Claim 4 wherein said plurality of adhesive resins for enhancing adhesion is selected from the group consisting of isoprene polymer rubbers, isoprene copolymer rubbers, styrene-butadiene-styrene copolymer rubbers, nitrile copolymer rubbers, vinyl acetate/vinyl versatate copolymers, ethyl vinyl acetate copolymers, polyvinyl acetate polymers and polyvinyl acetate copolymers.

22. The lime-free admixture composition for hydraulic cement according to Claim 5 wherein said plurality of adsorbents providing a dry lime-free admixture composition is selected from the group consisting of Perlite, calcium carbonate and diatomaceous earth.

23. The lime-free admixture composition for hydraulic cement according to Claim 6 wherein said plurality of water retention agents is selected from the group consisting of isoprene polymer rubbers, isoprene copolymer rubbers, styrene-butadiene copolymer rubbers, polyvinyl acetate/vinyl versatate copolymers, polyethylene oxide polymers, hydroxyl propyl methyl cellulose polymers, hydroxyl ethyl methyl cellulose polymers, polyethylene glycol polymers, polyethylene glycol copolymers, polyacrylamide polymers, polyacrylamide copolymers, xanthan gums and guar gums, and said plurality of pumping aids is selected from the group consisting of polyethylene oxide polymers, hydroxyl propyl methyl cellulose polymers, hydroxyl ethyl methyl cellulose polymers, polyethylene glycol polymers, polyethylene glycol copolymers, polyacrylamide polymers, polyacrylamide copolymers, xanthan gums, guar gums, Perlite, calcium carbonate and diatomaceous earth.

24. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein a combination of the lime-free admixture composition, hydraulic cement, a plurality of aggregates and water comprises a masonry composition selected from the group consisting of a concrete composition, a mortar composition, a stucco composition and a grout composition.

25. The lime-free admixture composition for hydraulic cement according to Claim 1 wherein a combination of the lime-free admixture composition, hydraulic cement, a plurality of aggregates and water provides a stucco composition for applying the stucco composition directly to non-wire mesh wrapped expanded polystyrene substrates.

26. A lime-free admixture composition for hydraulic cement comprising, in combination: a plurality of emulsifiers, a plurality of toughening resins emulsified by said plurality of emulsifiers and a plurality of accelerators for hardening a mixture comprising hydraulic cement, a plurality of aggregates, water and the lime-free admixture composition.
27. The lime-free admixture composition for hydraulic cement according to Claim 26 further comprising a plurality of overcoat resins for providing a coating on an outer surface of a hardened product formed from the mixture comprising hydraulic cement, the plurality of aggregates, water and the lime-free admixture composition.
28. A method for using lime-free admixture compositions to make masonry compositions comprising the steps of: providing a plurality of emulsifiers, a plurality of toughening resins emulsified by said plurality of emulsifiers and a plurality of accelerators for hardening a mixture comprising hydraulic cement, a plurality of aggregates, water and the lime-free admixture composition.

29. The method for using lime-free admixture compositions to make masonry compositions according to Claim 28 further comprising the steps of:

providing a plurality of air entraining agents;

5 providing a plurality of overcoat resins to coat an outer surface of a hardened product formed from the mixture comprising hydraulic cement, the plurality of aggregates, water and the lime-free admixture composition;

10 providing a plurality of adhesive resins for enhancing adhesion of the mixture comprising hydraulic cement, the plurality of aggregates, water and the lime-free admixture composition to a plurality of substrates;

15 providing a plurality of adsorbents for providing a dry lime-free admixture composition when the lime-free admixture comprises liquid ingredients;

20 providing a plurality of water retention agents for reducing the amount of water that is added to the mixture comprising hydraulic cement, the plurality of aggregates and the lime-free admixture composition; and

providing a plurality of pumping aids for controlling the rheology of the mixture comprising hydraulic cement, the plurality of aggregates, water and the lime-free admixture composition.

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30. The method for using lime-free admixture compositions to make masonry compositions according to Claim 28 further comprising the steps of:  
adding a first quantity of water into a mixer;  
5       blending a quantity of hydraulic cement with the water in the mixer;  
blending a quantity of the lime-free admixture composition into the water and hydraulic cement in the mixer;  
10       blending a first quantity of a plurality of aggregates into the water, hydraulic cement and the lime-free admixture composition in the mixer;  
blending a second quantity of water to the mixer;  
blending a second plurality of aggregates to the mixer;  
15       and mixing the mixture comprising water, the hydraulic cement, the admixture composition and the plurality of aggregates in the mixer for a period of time of less than about 4 hours.
- 20       31. The method for using lime-free admixture compositions to make masonry compositions according to Claim 30 wherein the first quantity of water comprises about 7% to about 8% of the mixture; the quantity of hydraulic cement comprises about 20% to about 23% of the mixture;  
25       the quantity of lime-free admixture composition comprises about 0.1% of the mixture; the quantity of the first plurality of aggregates comprises about 30% to about 34% of the mixture; the second quantity of water comprises less than about 2% of the mixture; and  
30       the second quantity of the plurality of aggregates comprises about 34% to about 41% of the mixture.